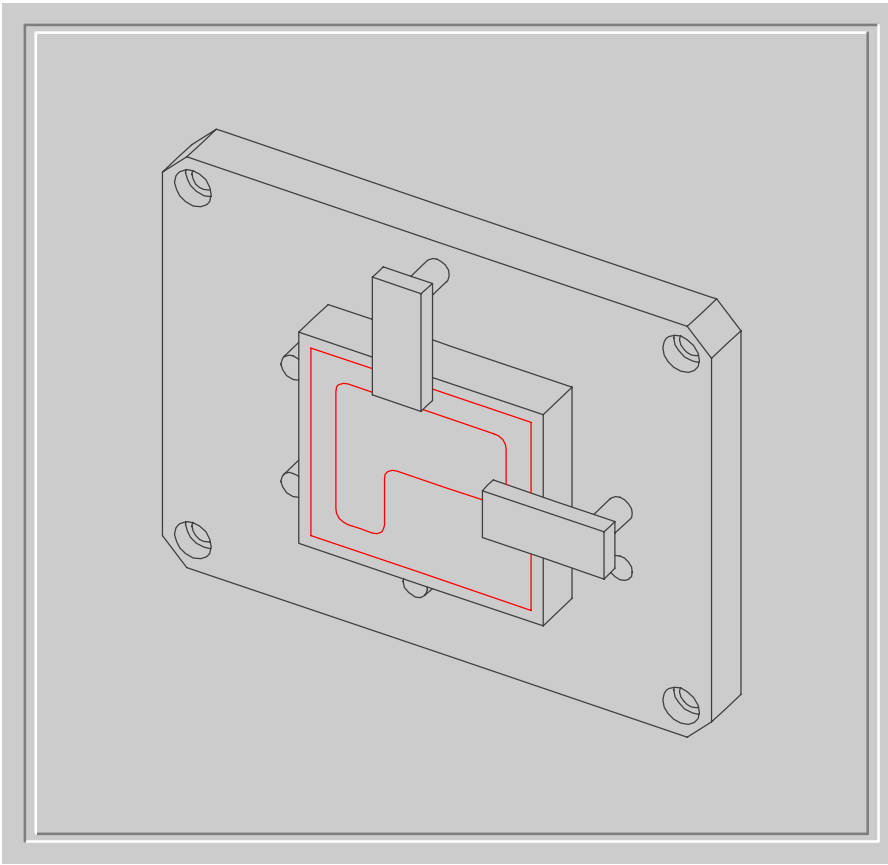


Building a Setup Assembly

I-DEAS® Tutorials: Milling Projects and Turning Projects

You can create operations and generate toolpaths for a job with only a part. However, a part alone doesn't reflect your setup on the shop floor.

In this tutorial, you'll create a setup assembly. You'll learn how to add stock, clamps, and fixtures to represent your setup fully in the software. By adding these elements to your setup, you will generate more accurate toolpaths.

Learn how to:

- add a fixture
- add stock
- add a part
- add clamps

Before you begin...

Prerequisite tutorials:

- all tutorials under the Modeling Fundamentals menu
- Introduction to Generative Machining

The file you need for this tutorial is distributed with the product. You must copy it into your local directory.

Move to the local directory where you want to copy the file. Then:

In UNIX:

cp $SDRC_INSTL/examples/nc/ tut_nc_setup.arc .

In Windows:

copy %SDRC_INSTL%\examples\nc\ tut_nc_setup.arc .

If you can't copy the file, you may have to set up the variable needed to copy from the I–DEAS installation.

. sdrc_oadev

If you can't access the file, contact your system administrator. The file may not be installed.

If you did not start I-DEAS with a new (empty) model file, open a new one now and name it ncsetup.

File
Open

Model File Name: ncsetup
OK

Make sure you're in the following application and task:

Application: Manufacturing
Task: Generative Machining

Set your units to inches.

Options
Units

Inch (pound f)

Import the archive file that contains the parts and tools that you need to complete this tutorial. Importing an archive file can take several minutes. Be patient.

File
Import

Import Selections form


I–DEAS Archive File
OK

File Name Input form

Archive file name: tut_nc_setup.arc
OK

The Manufacturing application quits, an informational message is displayed (the message will dismiss automatically), and the archive file is imported.

Import Archive File Status

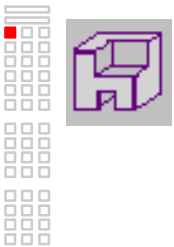

Check *I-DEAS List*.

Be sure to check the List region to be sure that the parts imported properly.

Dismiss

A second informational message is displayed (the message will dismiss automatically) and the Manufacturing application starts.

Create a job. When you create a job, the software automatically creates a setup assembly. You will add instances of the fixture, stock, part, and clamp to the setup assembly.

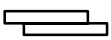


NC Job Create form

Job Name: Setup Tutorial Job

OK

Recovery Point



File
Save

Warning!

If you're prompted by I-DEAS to save your model file, respond:

No

Save only when the tutorial instructions tell you to—not when I-DEAS prompts for a save.

If you make a mistake at any time between saves and can't recover, you can reopen your model file to the last save and start over from that point.

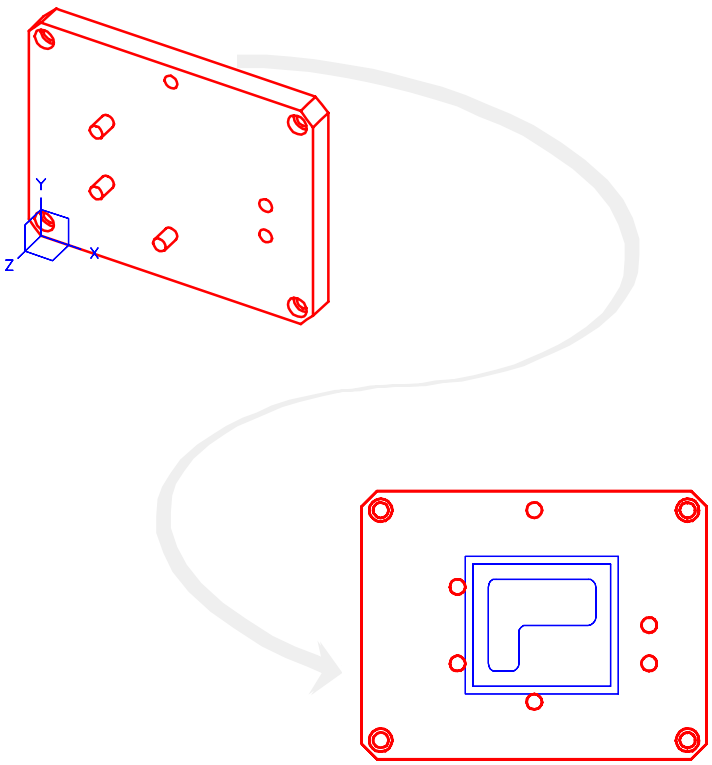
Hint

To reopen your model file to the previous save, press Control-Z.

In the next steps, you'll add a fixture to the setup assembly. Fixtures are workholding devices positioned below the workpiece (part and stock).

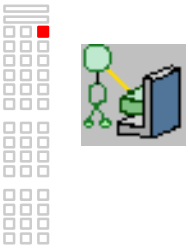
You'll also display the workplane origin and position the fixture relative to it. Then the workplane origin is at the origin of the global–space coordinate system, which is program zero for the setup.

Instances in an assembly can be positioned using constraints or position commands. In this tutorial, you will use both constraints and position commands.



What: Add the fixture to the setup.

How:



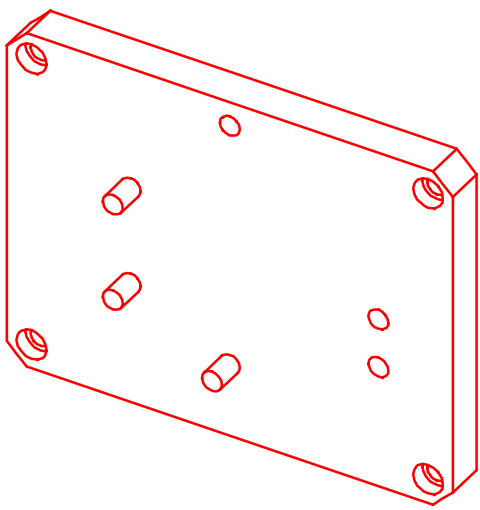
Get

From Bin/Library

Select Part/Assembly form

tut_fixture

OK

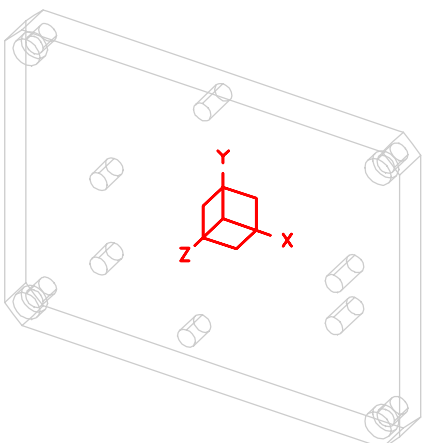


What: Display the workplane origin.

How:

Workplane Attributes form

- *Display Origin*—On
- *OK*

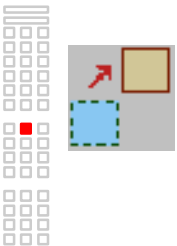


Things to notice

The setup will be positioned relative to the Z axis of the workplane origin and global-space coordinate system. The Z axis represents the tool axis of the machine.

What: Move the fixture to the global-space coordinate system.

How:

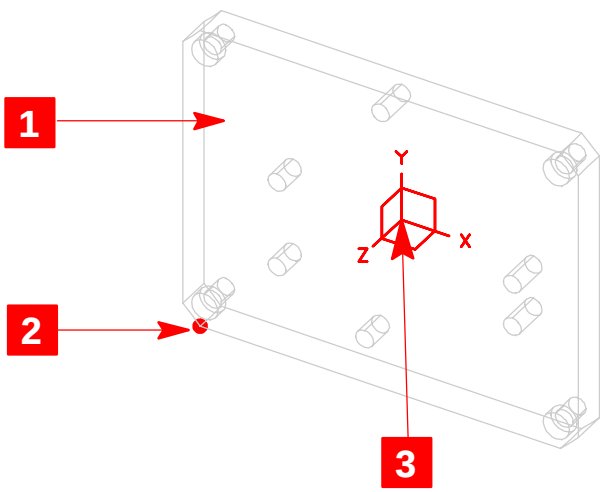


1 anywhere on the fixture

Move To

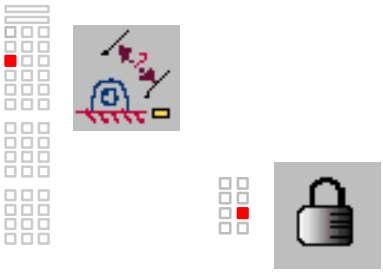
2 V9

3 origin of coordinate system



What: Lock the fixture to the setup assembly. Locking the fixture prevents it from being moved.

How:



1 pick anywhere on the fixture

Hierarchy

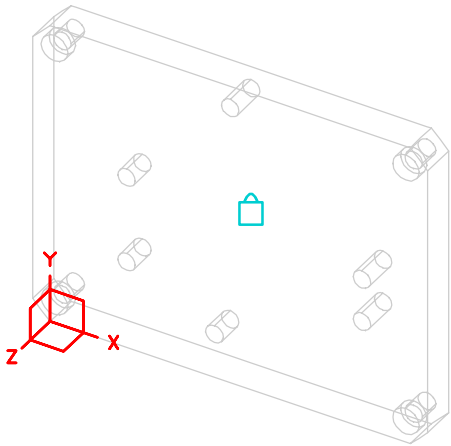
Hierarchy Selection form

Setup−1_Assembly

OK

Close the *Constrain* panel by double−clicking in the upper left corner.

Result



Things to notice

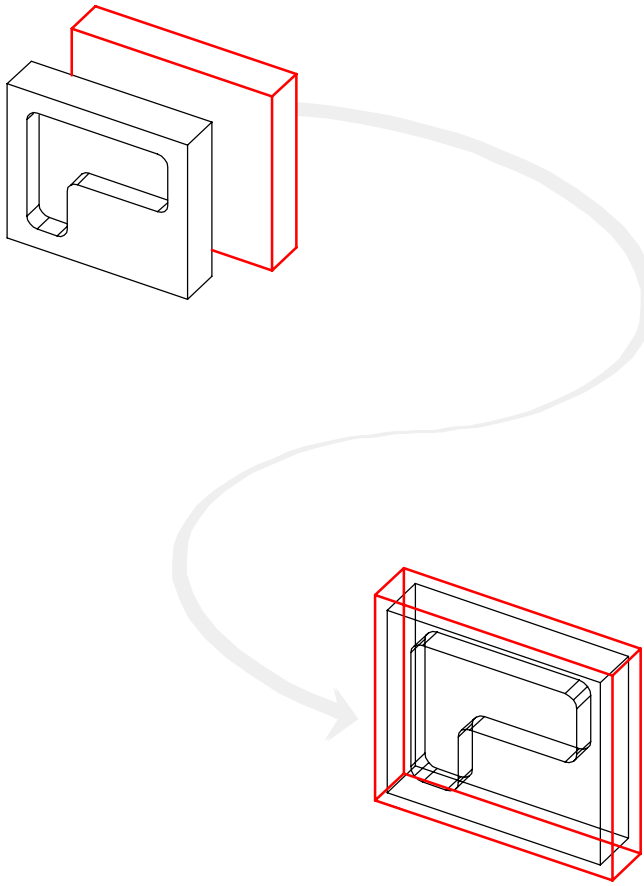
The fixture is positioned on the workplane origin and global-space coordinate system, or program zero. When you generate toolpaths for this setup in the next tutorial, the CL data is created relative to this coordinate system.

Recovery Point

File
Save

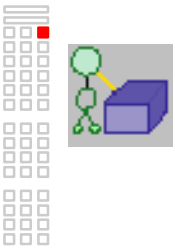
Add stock

In the next steps, you'll add a stock instance to the setup assembly. A stock instance represents the volume of material that you're about to machine. You'll then position and constrain the stock instance relative to the fixture.



What: Add stock to the setup assembly.

How:



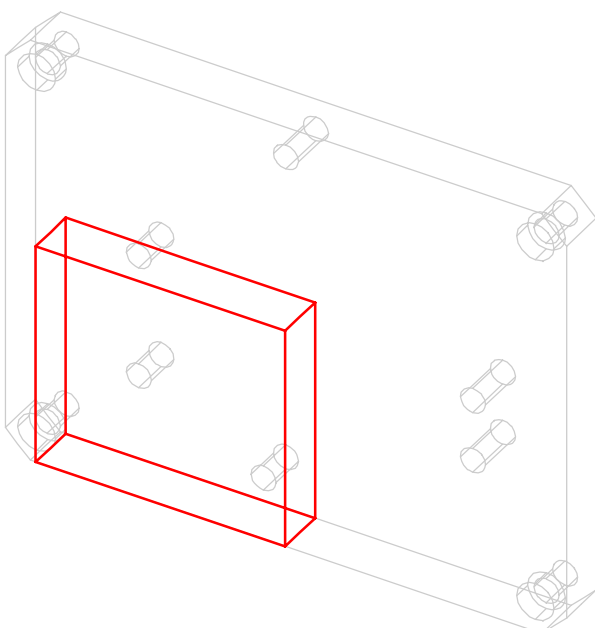
Get

From Bin/Library

Select Part/Assembly form

tut_stock

OK



Recovery Point

File
Save

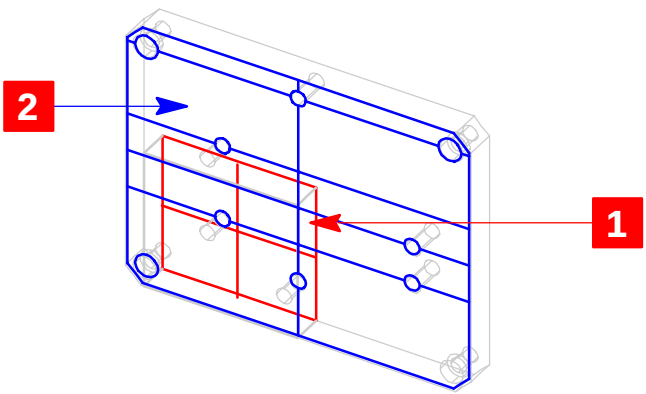
What: Move the stock into position on the fixture.

How:

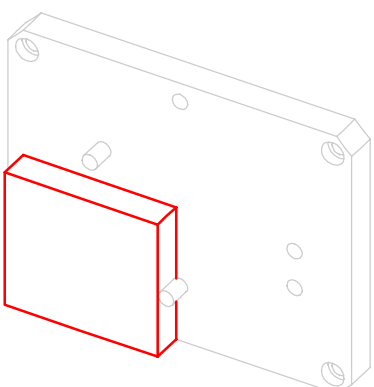
1 F2 (bottom of stock)

 (if necessary)

2 F31 (top of fixture)



Things to notice The green and yellow arrows show the degrees of freedom.

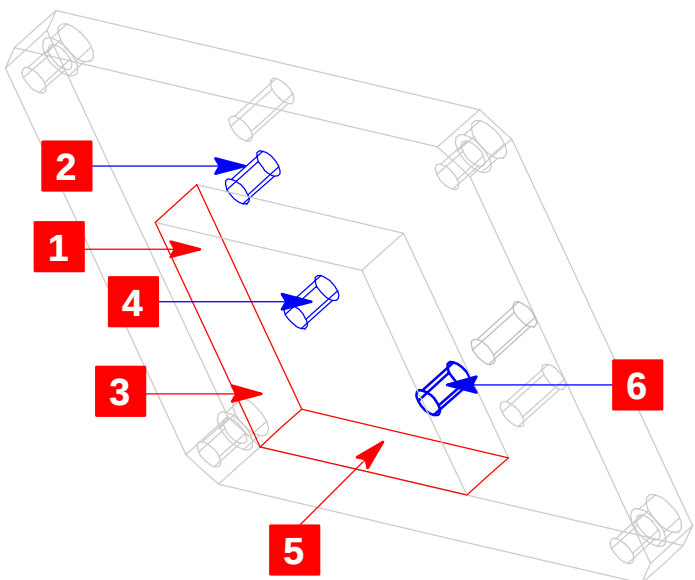


Don’t close the *Constrain* panel.

What: Move the stock so that it is tangent to the pins of the fixture.

How:

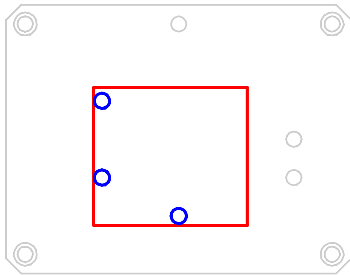
1. F5 (side of stock)
2. F3 (side of pin)
3. F5 (side of stock)
4. F2 (side of pin)
5. F6 (side of stock)
6. F1 (side of pin)



Close the *Constrain* panel by double−clicking in the upper left corner.

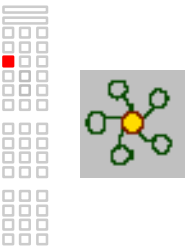
Things to notice

Your result may have the stock tangent to the wrong side of the pins. If so, you can fix it in the next steps.



What: Move the stock so that it is tangent to the correct sides of the pins.

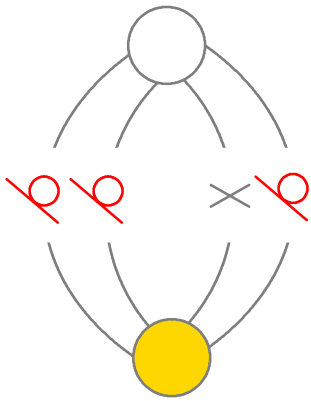
How:



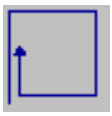
Pick anywhere on the fixture.

Don’t close the Assembly Relations Browser form.

Assembly Relations Browser form



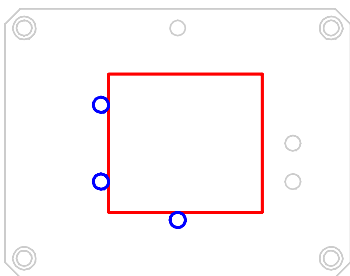
Pick one of the tangent constraints on the *Assembly Relations Browser* form.



Flip

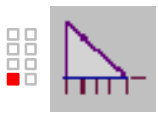
Repeat for the other tangent constraints. Then dismiss the *Assembly Relations Browser* form.

Dismiss



What: Use Show Free to see that the stock is fully constrained.

How:



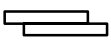
 accept if necessary

Pick anywhere on the stock.

 **Check *I-DEAS List***.

Close the *Constrain* panel by double−clicking in the upper left corner.

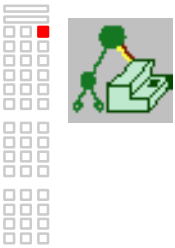
Recovery Point

 *File*
Save

In the next steps, you'll add a part instance to the setup assembly. You'll then position the part within the stock.

What: Add a part to the setup assembly.

How:



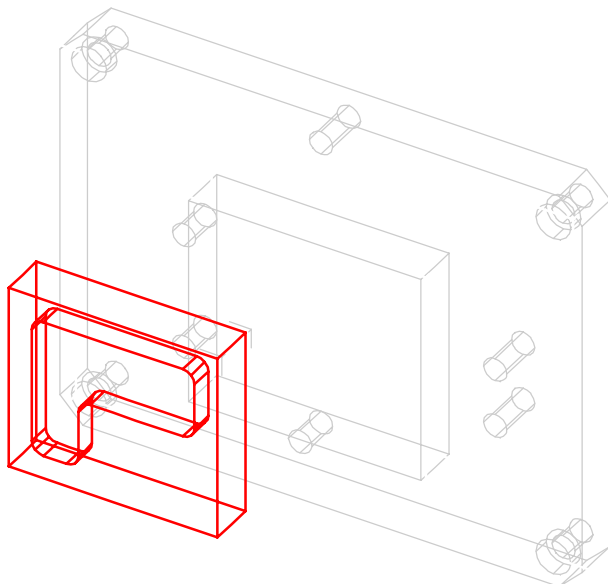
 *Get*

 *From Bin/Library*

Select Part/Assembly form

 tut_lpocket

 *OK*

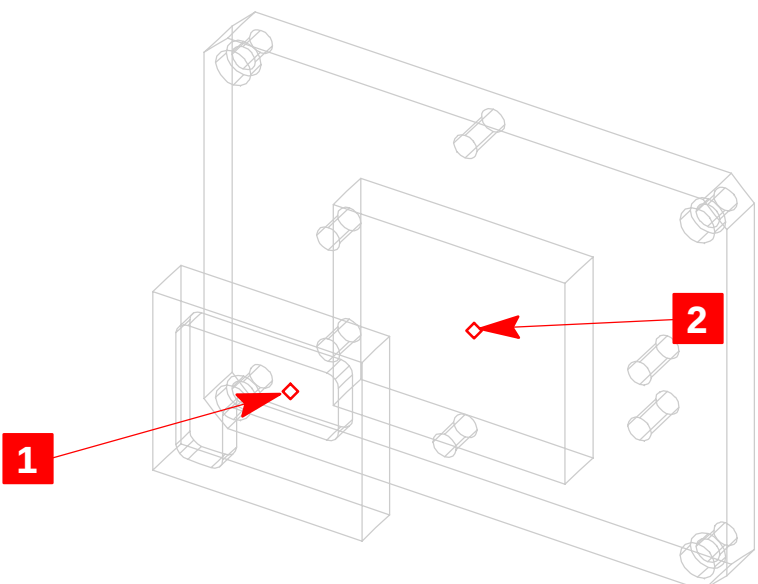


What: Constrain the reference point of the part to the reference point of the stock. Reference points are created in the Modeling task.

How:

1 RF1 (reference point on part)

2 RF1 (reference point on stock)



Don’t close the *Constrain* panel.

What: Constrain the edge of the part to the edge of the stock, and the bottom face of the part to the bottom face of the stock.

How:

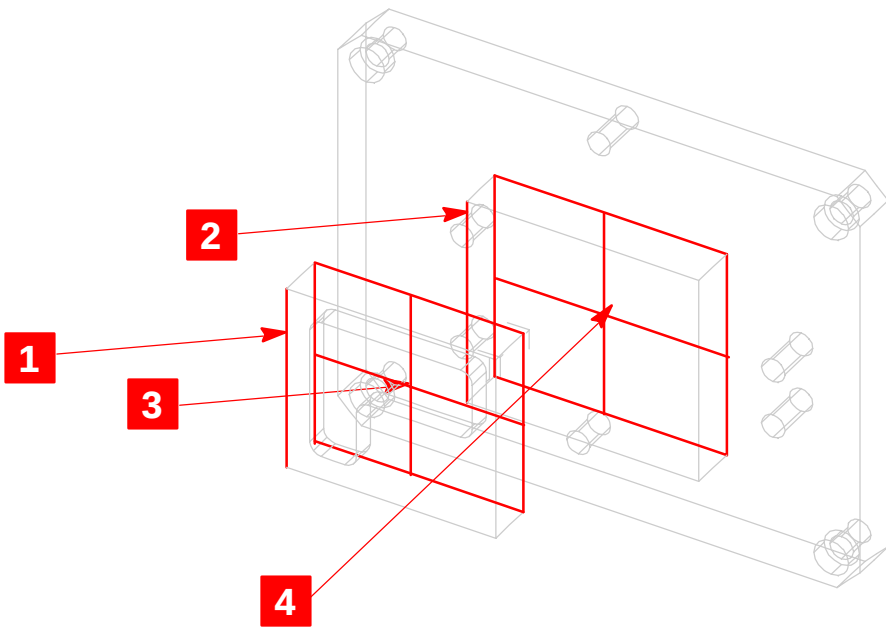
1 E3 (edge on part)

2 E3 (edge on stock)

3 F5 (face on part)

 accept if necessary

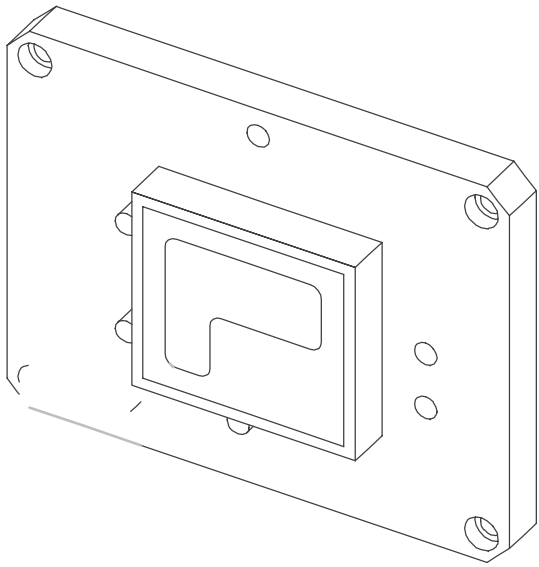
4 F2 (face on stock)



Close the *Constrain* panel by double−clicking in the upper left corner.

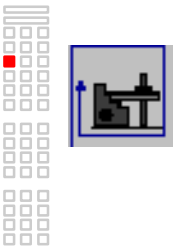
Things to notice

The top of the stock and the top of the part are aligned. For this example, assume that a facing operation isn't required. If you required a facing operation, you'd likely want to increase the size of the stock to offset it from the top surface of the part.



What: Examine the Setup Specification form to see how the instances are classified.

How:



Setup Specification form

Things to notice

The instances are indented under their classification.

Dismiss

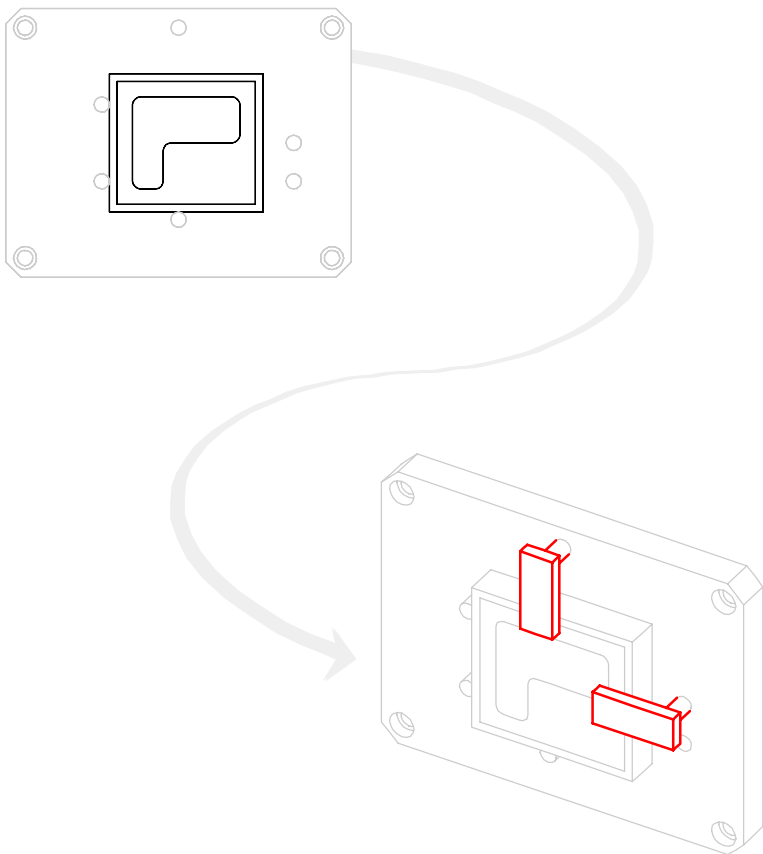
Recovery Point

File
Save

Add clamps

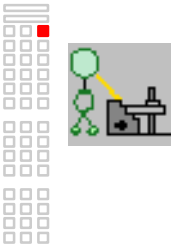
In the next steps, you'll add two clamp instances to the setup assembly. Clamps are workholding devices that are positioned above or on the workpiece and must be avoided by the tool during machining.

After you get the clamps, you'll position them in the holes of the fixture and rotate them onto the workpiece.



What: Add a clamp to the setup assembly.

How:



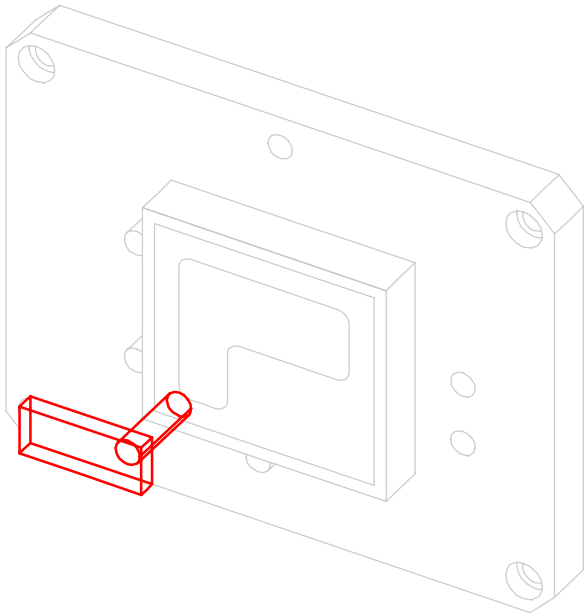
 *Get*

 *From Bin/Library*

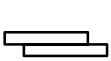
Select Part/Assembly form

 tut_clamp

 *OK*



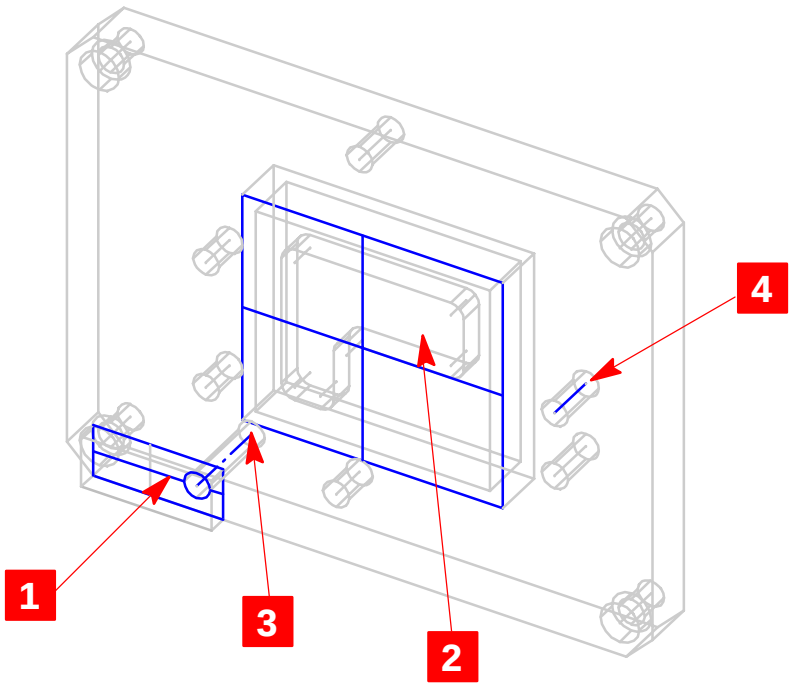
Recovery Point

 *File*
Save

What: Constrain the bottom surface of the clamp to the top surface of the stock, and a point on the centerline of the clamp post to the centerline of the hole.

How:

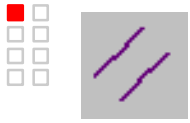
1. F8 (bottom of clamp)
2. F1 (top of stock)
3. CP2 (point on centerline of clamp post)
4. CL14 (centerline of hole)



Don’t close the *Constrain* panel.

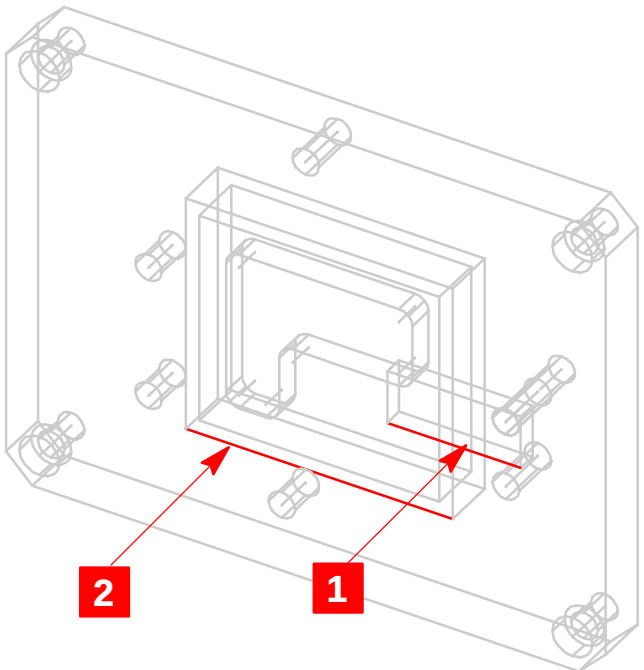
What: Constrain the side of the clamp to the side of the stock.

How:



1 E6 (edge of clamp)

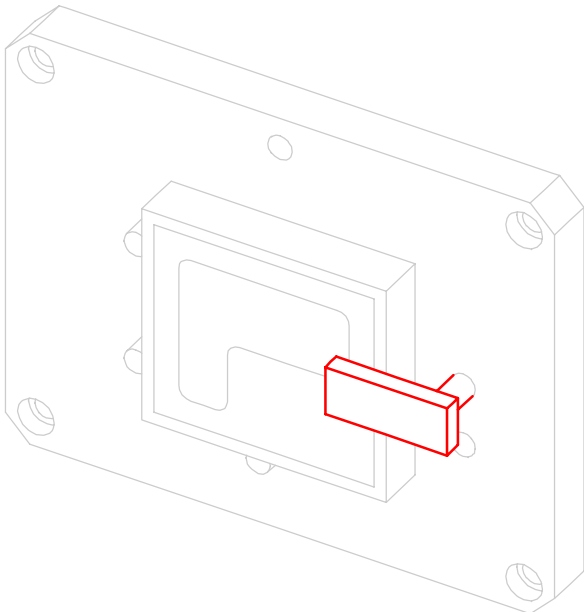
2 E4 (edge of stock)



Close the *Constrain* panel by double−clicking in the upper left corner.

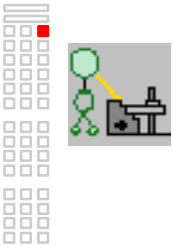
Things to notice

The clamp is positioned in the fixture and on the workpiece.



What: Add a second clamp to the setup assembly.

How:



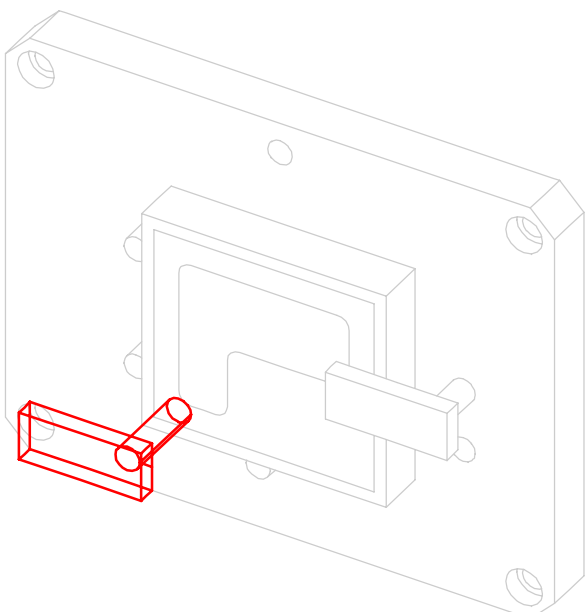
Get

From Bin/Library

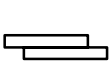
Select Part/Assembly form

tut_clamp

OK



Recovery Point

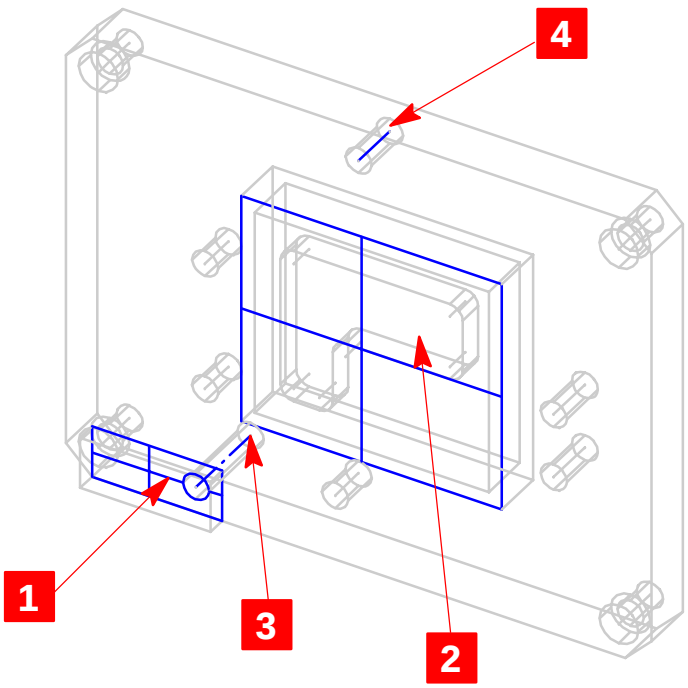


File
Save

What: Constrain the bottom surface of the clamp to the top surface of the stock, and a point on the centerline of the clamp post to the centerline of the hole.

How:

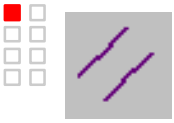
1. F8 (bottom of clamp)
2. F1 (top of stock)
3. CP2 (point on centerline of clamp post)
4. CL12 (centerline of hole)



Don’t close the *Constrain* panel.

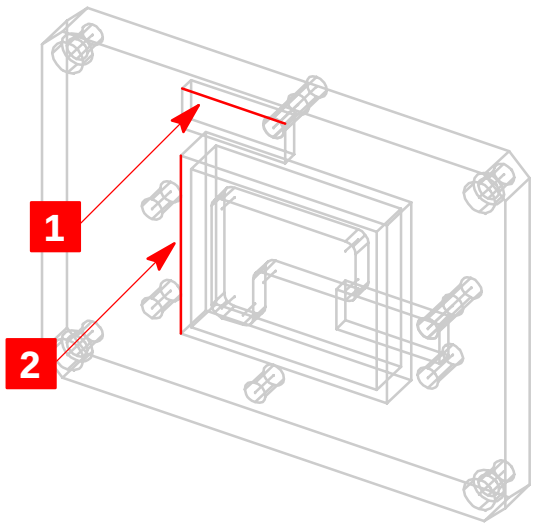
What: Constrain the side of the clamp to the side of the stock.

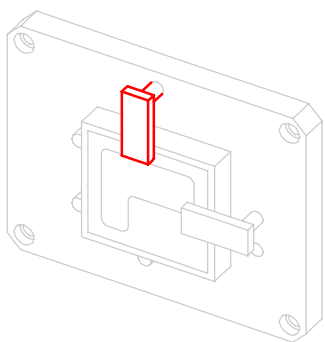
How:



1 E12 (edge of clamp)

2 E3 (edge of stock)

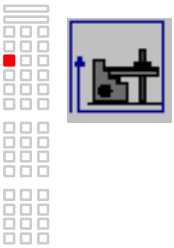




Close the *Constrain* panel by double−clicking in the upper left corner.

What: Check the Setup Specification form.

How:



Things to notice The box on the right side of the form lists each part instance in the setup.

Setup Specification form

Dismiss

Recovery Point

File
Save

Warning!
Don’t delete this model file once you’re finished. You’ll use this model file and job in the next tutorial.

Tutorial wrap-up

You’ve completed the Building a Setup Assembly tutorial.